



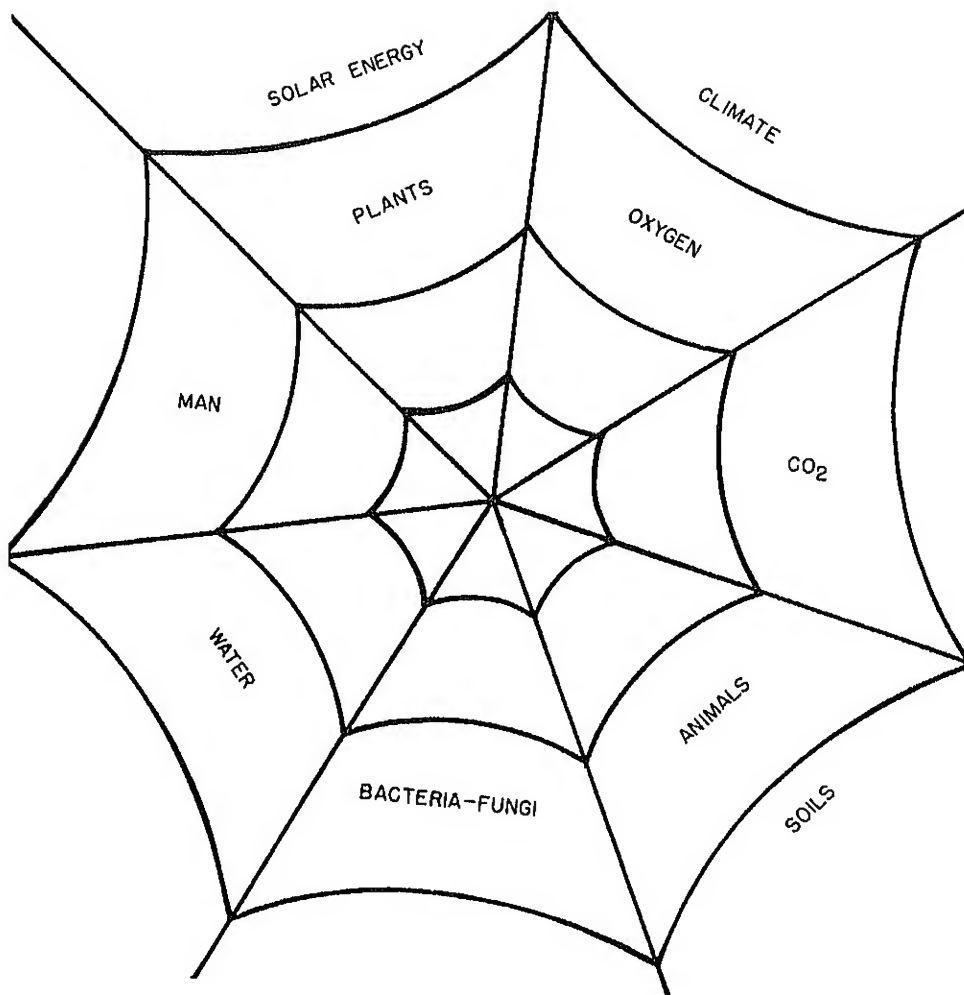
**United States  
Department  
of Agriculture  
Soil  
Conservation  
Service  
Salina, Kansas**



# **KANSAS**

# **ECOLOGY**





Ecosystems may be compared to a spider web in which relationships between living things are complex.

Revised June 1986

# Ecology: Study of Ecosystems

The whole earth is composed of small areas or units called ecosystems.

Ecology is the study of those ecosystems--or the interrelationship between all living and nonliving things, and how a change in one can affect another.

Ecosystems may be compared to a web in which one organism does not have a simple relationship to another; but rather all forms of life in the ecosystem have an extremely complex relationship to each other.

## Parts of an Ecosystem

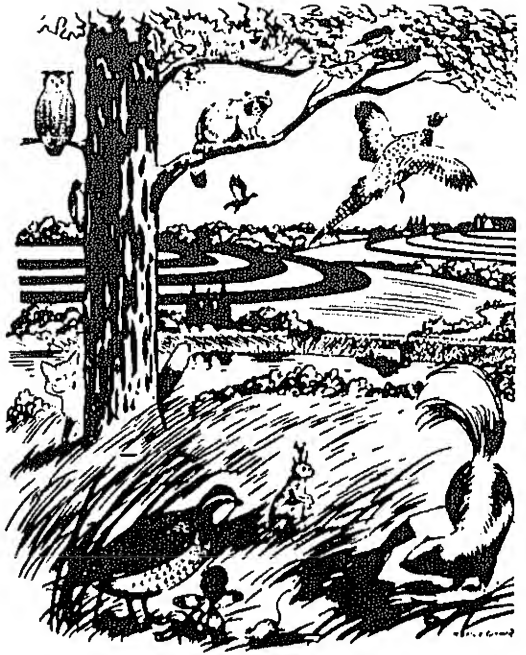
The ecosystem is composed of living and nonliving parts. The soil, water, and air are the nonliving components, while the living parts include producers, consumers, and decomposers.

Plants, as producers, use the sun's energy to make food by a process called photosynthesis.

Consumers are classed in three types: Herbivores which eat plants; the carnivores which eat flesh; and the omnivores which feed on both plants and animals. Man is considered an omnivore.

The decomposers such as fungi and bacteria feed on the dead material. Matter is thus returned to the nutrient pool, which completes the energy cycle.

## Checks and Balances



Natural ecosystems have evolved over a long period of time. Each member of the system, such as plant, animal, fungus, and bacteria, has adapted to other members and to its particular environment. Checks and balances within the system allow a high level of efficiency, stability, and nutrient conservation.

The success of these systems is the result of diversity within the ecosystem and the interactions that have evolved along with the living organisms. Diversity is important in that the more diverse the ecosystem, the more stable it is. Increasing diversity is extremely important in urban areas and on farms.

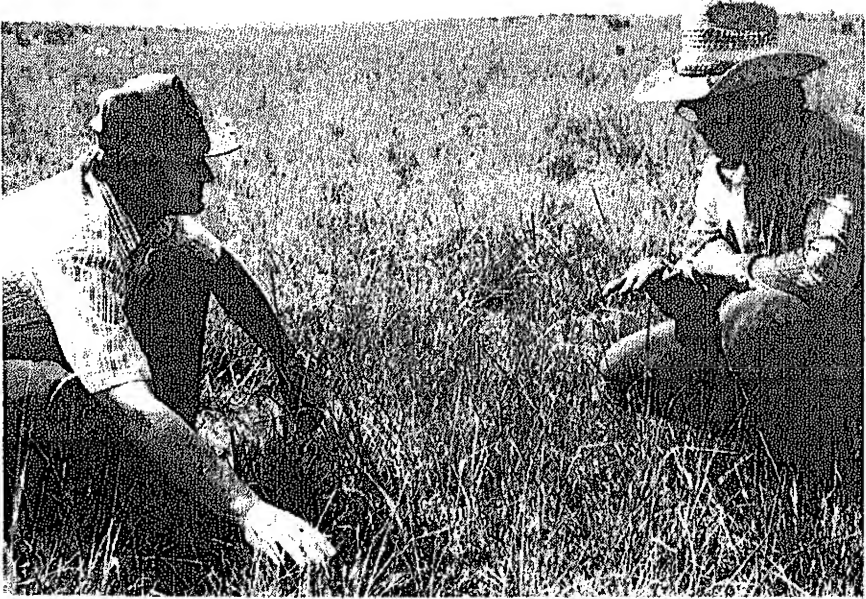
## Ecosystem Example

Let's take a simplified example of a natural grassland ecosystem in the Flint Hills of Kansas. This area has a mean annual temperature of 55 to 57 degrees and annually receives 26 to 32 inches of precipitation. Certain grasses and other plants have evolved and become adapted to these temperatures, precipitation, and soils conditions. Animals have evolved that were capable of using the plants.

Within recent geologic time, bison, deer, antelope, jackrabbits, prairie dogs, and other herbivores have consumed these plants. The Indians were omnivores who lived on these animals as well as on edible portions of plants. Carnivores such as wolves and bobcats preyed upon the animals.

Bacteria and fungi decomposed dead plants and animals to basic nutrients required for plant growth. Thus a complete ecosystem was established and has continued to flourish.





A planned grazing system helps maintain a balanced ecosystem and is profitable to the rancher.

With the coming of Europeans a century ago, domestic livestock replaced the bison. The slaughter of the bison destroyed the vitality of the Indians, which made it easier for the pioneers to replace the Indians in the ecosystem.

Prairie fires were a natural part of the prairie development that limited trees and shrubs in the ecosystem. Where fire has been checked by man, a change in the plant and animal communities has resulted. An increase in woody plants has increased bobwhite quail and deer habitat, while reducing available forage for livestock and other herbivores.

If grazing animals are allowed to overgraze an area, the balance of the ecosystem is changed.

One of many complex changes is increased soil erosion and pollution of streams with sediment and consequent changing of the ecosystem of streams.

High producing livestock and wildlife management systems that properly use and conserve the natural plant and animal communities maintain a balanced ecosystem that is generally similar to the ecosystem existing more than a century ago.

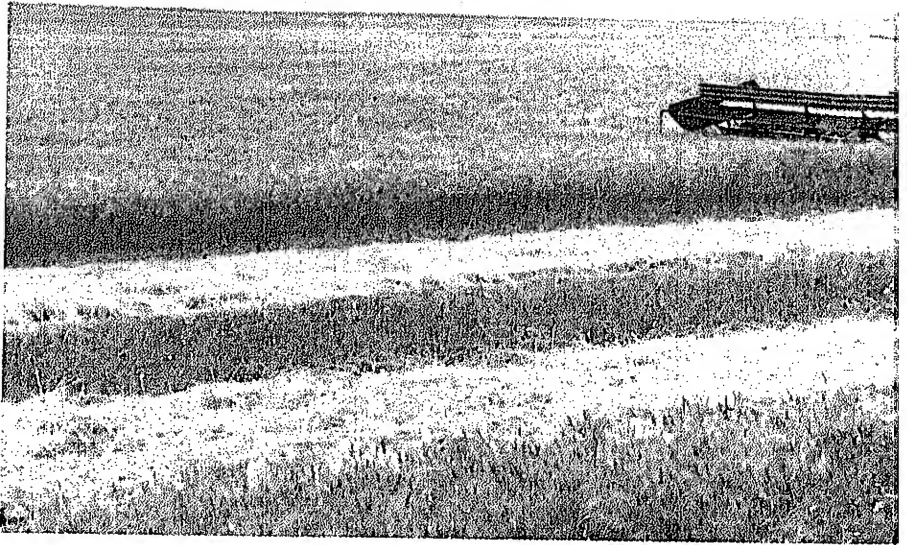
## Ecological Dominance

Man has become a dominant member of the earth's ecosystems because of his ability to employ machinery, chemicals, and other means to magnify this influence. Although man is dominant, he is still dependent upon the ecosystem in which he has evolved. This system is our most valuable resource, not soil, water, or air, but the system! It must provide for not only our physical needs, but our psychological needs as well.

But modern man has not always properly managed the system and environment on which he is biologically dependent.

Americans each year junk more than 7 million cars, 100 million tires, 20 million tons of paper, 28 billion bottles, and 48 billion cans, rather than recycling them through the system.

Industries have created waste dumps of hazardous materials which have made some areas unfit for human habitation.

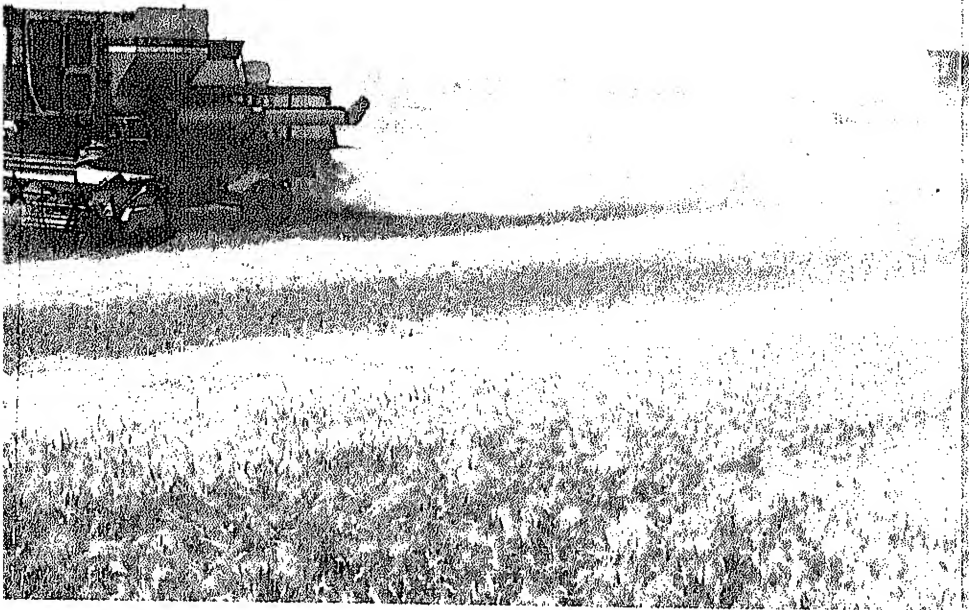


Man dominates the world ecologically, both in its

Acid rain is slowly turning many lakes to a condition where fish and other aquatic organisms cannot grow.

World population has been doubling about every 35 years in this century. U.S. population is increasing one percent a year; even this small amount imposes a





vast wheat fields and in large urban centers.

great burden on the resources of Kansas, the United States, and the world. Many of our nation's problems are related to crowding--restricted recreation opportunities, crowded classrooms, crowded campgrounds, crime transportation problems, and related social problems.



A complete conservation cropping system maintains soil productivity and reduces erosion and resulting sediment.

Geologic erosion of the land is a slow, natural process, but man's activities have often resulted in accelerated soil erosion. This erosion has drastically altered the ecosystems. More than 220 million tons of topsoil are lost each year from the land in Kansas. The amount of soil eroded from heavily cropped fields can run as high as 6,000 tons per square mile per year. Furthermore, soil lost from land undergoing urban development can run as high as 10,000 tons per square mile. But does it really make any difference where

this eroded soil comes from? It still becomes sediment that turns clear waters muddy, kills fish, and makes water unfit to drink.

Damage to agricultural land is heavy. Soil fertility for crop growth is reduced. Farm machinery has difficulty operating in eroded areas. Topsoil can be lost far more rapidly than it can be produced by natural processes.

Erosion in urban areas damages buildings, highways, and plant growth. Generally about half of the eroded soil results in sediment in bodies of water--or even more in small drainage areas next to bodies of water.

## Solutions

What can be done? First of all it is essential that Kansans be accurately and widely informed about the state of the environment and alternatives available for improving it. Individual and community actions are the key to solving these problems, and these decisions should be made by well informed citizens.

Every citizen has had a part of creating the kind of ecosystem we live in. He or she has both the chance and the responsibility to help improve it.

Problems created by past mistakes can be corrected. Hazardous waste dumps can be cleaned up, and a greater effort can be made to recycle materials. Great strides have already been made in areas such as pesticides, where harmful chemicals such as DDT have been virtually eliminated from the food chain.



A teacher helps youngsters explore the interrelationship of living things.



Methods to control soil erosion are available. Terraces, contour farming, grass waterways, and conservation tillage have been very successful in combating the erosion problem. But in order to install conservation on the land, all citizens should be aware of the problems and what solutions are available.

An excellent starting point is conservation education in the schools. The main purpose is to develop a conservation conscience in young people. One of the best means to achieve this is by using the resources out-of-doors; namely the outdoor classroom, where all subjects are taught in a hands-on experience.

# Organizations

Kansans should become involved in organizations which work for a better environment.

Many people have spent their lives improving the environment--with significant results. Leaders of the 105 local conservation districts in Kansas (and over 3,000 districts nationally), and thousands of landowners and professional conservationists have been working together. In many areas, their efforts have made the water cleaner, the air fresher, and the land more attractive and more useful.

Conservation districts continue to broaden their programs to do a better job in environmental improvement.

The USDA Soil Conservation Service, other U.S. Department of Agriculture agencies, and other state and federal agencies continue to adopt conservation measures for specific environmental needs, and to provide the best possible alternatives in total resource planning.

## Investing in a Better Environment

Kansans need to overcome the feeling that they can't afford the cost of improving the environment. The cost of a degraded environment is far greater than most people realize. It's a matter of priorities. People can accomplish anything they wish if they set their sights high enough.

The challenge before all citizens is to invest part of

the proceeds of economic growth into creating a cleaner, healthier, and more enjoyable environment. Only in this manner can we hope to enhance the quality of life in Kansas and America.

If people understand something of the intricate workings of ecosystems, they will be able to correct many of the environmental errors of the past and prevent them in the future.

Locally governed conservation districts in Kansas have a written memorandum of understanding with the Soil Conservation Service and other agencies to carry on conservation programs. You can help by joining them in this effort.

#### NON-DISCRIMINATION STATEMENT

All programs and services of the U.S. Department of Agriculture are available to anyone, without regard to race, color, religion, sex, national origin, age, or handicap.



A conservation district board of supervisors discusses conservation.